CURRENT LITERATURE

NOTES FOR STUDENTS

Mucor and Chaetocladium.—BURGEFF[1] has given an interesting account of the relations between the parasite *Chaetocladium* and the host *Mucor*. The *Chaetocladium* investigated reacts physiologically like *C. Fresenianum*, but morphologically more like *C. Brefeldi*, although its spores are larger than in the latter species. The *Mucor* host was a variety of *Mucor mucedo* which BURGEFF describes as *Mucor mucedo dependens*.

The course of infection was followed in both fixed and living condition. Fortunately the plasma of the parasite stains more deeply than that of the host, so that host and parasite can be distinguished in sectioned material. When growing together the filaments of the *Mucor* host are attracted by those of *Chaetocladium*. Filaments of the parasite apparently are not attracted by those of the host until they are within a very short distance of each other. Contact of the two kinds of filaments is a stimulus which causes a slight thickening of the tip of the *Chaetocladium* hypha, inhibits its growth in length, and finally causes the formation of a cross wall cutting off the terminal portion of the filament of the parasite, which becomes the gall cell. The adjacent walls of the host and parasite dissolve, and plasma and nuclei of the host enter the gall cell, which at once swells and branches. In the gall cell the nuclei of the host are arranged peripherally and undergo division, while those of the parasite are centrally located and apparently do not divide. The gall cell is termed heterocaryotic (or a mixochimaera), since it contains two kinds of nuclei in contrast with the homocaryotic hyphae of the host and of the parasite. It is in open communication with the host hypha, but separated from the parasite by a membrane. Some of the branches from the primary gall are heterocaryotic and some homocaryotic, containing only *Mucor* nuclei. These latter branches form secondary galls in contact with pure *Chaetocladium* filaments. Apparently gall branches never contain only *Chaetocladium* nuclei, perhaps because the latter do not divide when in association with the host plasma. Branches of *Chaetocladium* from below the gall intermingle with those of the latter, thus increasing the area of contact between the gall and parasite. Apparently it is only at contact surfaces between the heterocaryotic gall and the *Chaetocladium* hyphae that diffusion to the advantage of the parasite can take place. At any rate, after contact of *Chaetocladium*

[1] BURGEFF, H., Über den Parasitismus des *Chaetocladium* und die heterocaryotische Natur der von ihm auf Mucorineen erzeugten Gallen. Zeitsch. Botanik 12:1–35. *figs. 36.* 1920.

filaments with these gall cells the parasite grows out into fruiting branches. Single nuclei enter the single-spored sporangium and later divide twice, producing the four nuclei of each spore (rarely two or more than four).

The association of the plasma of host and parasite in a mixochimaera is supposed to render the protoplasmic membranes of the host permeable to diffusion of the material necessary to the normal growth of the parasite. The galls are also supposed to serve as a means of bringing about a branching of the host hypha in places such as old sporangiophores, where the ability to branch has been lost.

In seeking for a possible origin of the "sikyotic" parasitism (from σικυα = a cupping-glass) of *Chaetocladium*, BURGEFF discusses other cases of fusions in the fungi. In the anastomoses found in *Mortierella*, *Syncephalis*, Ascomycetes, and Basidiomycetes, a cross wall, if formed, is produced after the fusion, as shown by KNIEP, but in this case the process is connected with the distribution of nuclei in a diploid mycelium. Failing to find an analogy with vegetative processes, BURGEFF suggests that the curious type of parasitism which he has studied may have originated by way of sexual fusions; and in support of this suggestion points out the similarities between the processes involved in conjugation in the Mucors and those in the formation of his sikyotic galls in *Chaetocladium*. The suggestion is believed to need strengthening by tests with plus and minus races of host and parasite.—A. F. BLAKESLEE.

Calcium.—SHEDD[2] has found that the procedure which has been adopted by the Association of Official Agricultural Chemists for determination of calcium in soil solution does not give accurate results, due to the occlusion of calcium on the iron and aluminum precipitate that goes through the filter. He has evolved a new method which is simpler and avoids the errors of the present methods. The following findings for the Kentucky soils are of great interest. Cultivation has caused a considerable loss of calcium from these soils. The best types of these soils have the highest calcium content, and the poorest have the lowest. "Many samples have been found to be so low in calcium that their deficiency in this constituent requires consideration as well as their low phosphorus and nitrogen supply. The application of a ton of limestone or of rock phosphate per acre to such soils frequently adds more calcium than is already present. There is no doubt that, in such cases, these materials, or even moderate applications of some commercial fertilizers, are beneficial because of the plant food (calcium) they supply in addition to other good effects they may accomplish."

NELLER,[3] working on limed and unlimed plots of the New Jersey Experiment Station, finds that the oxidizing power of the limed plots is approxi-

---

[2] SHEDD, O. M., A proposed method for the estimation of total calcium in soils and the significance of the element in soil fertility. Soil Science **10**:1–14. 1920.

[3] NELLER, J. R., The oxidizing power of soil from limed and unlimed plots and its relation to other factors. Soil Science **10**:29–37. 1920.